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NPIC/TDS/D-799-67
10 April 1967

MEMORANDUM FOR THE RECORD

25X1A SUBJECT: [] Chip Comparator

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1. On 28 March 1967 [] were here to service the [] 405AM chip comparator. [] was here to try and determine the repeatability problems with the interferometers; and [] new field service manager, accompanied him to become acquainted with the problems.

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2. The cause of the complete count failure was traced to failure of the spring clamps on the R. F. oscillator tube. The tube prongs and clamps had become corroded and the clamps had lost their spring tension due to the high temperatures created by the tube. The condition was temporarily corrected but [] will have to retrofit all the oscillators with a more permanent pin connection. It is anticipated that with the temporary fix and eventual retrofit the lamp failure problem will be solved.

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3. The test point and [] trigger bias voltages were checked and found to be off optimum setting but still within operating tolerances. [] gave the Y interferometer a complete optical and electrical alignment check. In doing so it was noted that the negator spring was not functioning properly. After a preliminary electrical alignment, repeatability tests were made with the negator spring off and it was felt that the spring was contributing to the repeatability problem. The spring has been disconnected and [] is looking into a solution.

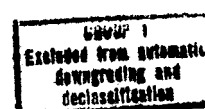
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4. In checking out the y axis, it was noted that the optical center of the interferometer travel is offset from the mechanical center of the stage travel by approximately $\frac{1}{4}$ " to $\frac{3}{8}$ " in a direction toward the top of the stage. There is no practical method of correcting this on the 405 machine. Mr. [] commented that the interferometers were set up for 4 inches of travel and that he didn't feel that we could expect long term reliability over $\frac{1}{4}$ " inches. I pointed out that the contract specified an accuracy of $\pm 2 \mu$ over $\frac{1}{4}$ " but he stated he was unaware of this and understood the chip comparators were only to be used over only 4" of travel. This is further

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compounded by the fact that the stages are mechanically capable of traveling approximately $4\frac{1}{2}$ to $4\frac{5}{8}$ " inches and there is no convenient way to coordinate the mechanical stage travel with the optimum optical tracking.

25X1A 5. It was also noted that the stage light to illuminate the full stage format did not illuminate the entire stage in all stage positions. This was noted by [] but it is doubtful if it can be corrected without significant redesign.

25X1A 6. On 29 March I made additional repeatability tests over 4" and $4\frac{1}{4}$ " inches with excellent results. In doing so I attempted to coordinate the stage travel with the optical center. A complete set of voltage bias readings was taken prior to performing the tests and it was determined that the test point voltages remained good but a slight shift had taken place in the [] trigger bias voltages. They were not adjusted before the repeatability runs. After the repeatability runs I attempted to adjust the [] trigger bias voltages and noted that one voltage remained uniform after adjustment but that the other was unstable and reacted differently on different runs and in opposite directions. It was also subject to change by light tapping of the pot. It was further noted that the maximum instability occurred in the same general areas as I have been noting the repeatability problem. 25X1A I called [] to discuss this and he is going to send replacement PC card to see if it helps. Additional testing will be required to determine the reliability and stability of the bias voltages.

7. As a result of the evaluation thus far I have requested that [] 25X1A take the following action to make the 405 AM chip comparator acceptable.

- a. Modify the Y axis negator spring to make it function properly.
- b. Modify the curtain assembly and Y axis bellows so that the variable light path is not restricted by the bellows and the bellows contain a adequate safety factor.
- c. Modify the Y belt drive tension roller assembly to permit the proper belt tension adjustment.

8. It is questionable as to whether the machine will achieve the $+2\mu$ accuracy over $4\frac{1}{4}$ " because of the count reliability. It is felt that they can achieve the accuracy over approximately 4" but the stages permit greater travel thereby possibly leading to an inadvertent sense of accuracy.

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25X1A Attempts to hold [] to the contractually stated accuracy will probably lead to many problems on behalf of both sides and I therefore recommend we accept the instruments on the basis of $\pm 2\mu$ accuracy & repeatability over $\frac{1}{4}$ inches of travel and have [] mechanically limit the stage travel to $\frac{1}{4}$ inches.

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Development Staff, TDS

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Distribution:

Orig - Project file
2 - TDS/DS

25X1A NPIC/TDS/DS [] (10 April 1967)

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Approved For Release 2002/06/17 : CIA-RDP78B04747A001500030027-4

NPIC/TDS/D-774-67
27 March 1967

MEMORANDUM FOR THE RECORD

25X1A SUBJECT: [] Chip Comparator

25X1A 1. On 21 March 1967 [] was here to service the [] 405 AM chip comparator. He was called in primarily because of repeatability errors and stage drive problems. 25X1

25X1A 2. To improve the Y stage drive, he attempted to reset the drive belt tension roller, but there was insufficient motion in the roller adjustment to put adequate tension on the belt to further improve the performance; bees-wax was added to the belt to increase friction, but this is only a temporary fix. It will be necessary for [] to increase the adjustment range or supply a shorter belt.

3. In attempting to determine the nonrepeatability of the Y measurements, it was found that the dust screen roller assembly was riding on the Y bellows and had in fact already worn two small holes in the bellows. It was also observed that the bellows end plate was hitting the antisag plate when the bellows were fully compressed and that the bellows end plate was distorted or bent each time it hit. (The bellows end plate referred to here was attached to the moving corner cube.) It was observed that by deflecting the bellows downward about a tenth of an inch the interferometer light path could be obstructed to completely stop the count, but it required an upward extension of the bellows of approximately three quarters of an inch to achieve the same light path obstruction. It was therefore concluded that the bellows were not centered about the light path and any future sagging of the bellows would cause interferometer failure.

4. To determine if the above noted problem had anything to do with the repeatability problem the bellows antisag plate and curtain assembly was removed, and the bellows replaced with a larger aperture X bellows from one of the 405B machines. The comparator was then put back in operational condition (less the above items) and [] returned to New York. It was not possible to determine the repeatability prior to his departure due to time. 25X1

5. It has since been determined that the repeatability problem still exists but is slightly more consistent. Because of the repeatability problems in the Y axis, the comparators do not achieve the ± 2 accuracy over the 4 1/4" and are therefore presently not acceptable.

[]
Development Staff, TDS 25X1

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Original - File
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